

SOME NEW NORTH AMERICAN COLLEMBOLA.

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In going over collections of Collembola from various parts of the country the following forms were found and are described as new in this paper.

Sinella hoffmani n. sp. (Figs. 1-2)

Length up to 3 mm. White to yellowish white with traces of rusty spots in some specimens. Eyes absent. Antennae three times length of head or as: 115:35, the segments as: 20:30:30:35. length of head or as: 115:35, the segments as: 20:30:30:35. Unguis (Fig. 1) with three inner teeth and two lateral ones. Unguiculus about three-fourths length of unguis, fringed on the outer border, lanceolate. Tenent hair reduced, two-thirds length of unguis, not knobbed. Tibiotarsi with usual rows of smooth hairs, and with 2 large subclavate fringed setae on the middle and hind legs. Third and 4th abdominal segments as: 15:40. Manubrium three-fourths as long as dens or as: 30:40. Dorsal crenulations of dens end two mucro-lengths from mucro. Mucro (Fig. 2) entomobrya-form, with two teeth and a basal spine. Scales absent. Body hairs of the usual kind, with long fringed ones and shorter plumose, reclinate hairs.

This species falls in the *curviseta* Brook group of *Sinella*, having the usual entomobrya-form mucro, but differs in having the eyes absent. It is larger in size than the North American species described. The antennae are much longer than given for *S. curviseta*.

Taken one-fourth mile inside cave where it was very abundant on bare clay. Cave at Lowmoor, Alleghany County, Virginia, March 1948, R. L. Hoffman.

Pseudosinella collina n. sp. (Figs. 3-5)

Length 1.0 mm. White but for traces of blue pigment on front of head, antennae, eyespots, and legs. Antennae heavily pigmented except base of 1st antennal joint light. Coxae heavily pigmented and legs with traces throughout. Light traces along lateral lines of body. Eyes (Fig. 4) 6 on each side, equal. Antennae slightly longer than head or as 70:50; proportions of segments as: 15:25:25:35. Body segments beginning with mesonotum as: 55:25:15:17:25:85:15:13; the 4th segment slightly more than 3 times the 3rd. Unguis (Fig. 5) almost straight with external tooth, and two teeth on inner margin. Unguiculus three-fourths the unguis,

lanceolate. Tenent hair weakly developed, unknobbed. Manubrium to dentes as 50:45. Mucro (Fig. 3) entomobrya-form. Rami 4-dentate, 1 basal seta.

This species is similar in general appearance to *P. candida* Fols. but differs in having only 6 eyes.

Collinsville, Illinois, Feb. 9, 1944, T. H. Frison, in ground cover.

Prospinanura n. gen.

Achorutinae in appearance and general characteristics. Mouthparts not produced in a cone. Antennae 4-segmented, shorter than head. Eyes four, two on each side of head in the only known species. Postantennal organ absent. Unguis present, unguiculus absent or tuberculate. Furcula and anal horns absent. With 8 heavy, straight spines on dorsum of last abd. segment. Color white with sparse specks and splotches of bluish pigment over body. With short, reclinate hairs over body, and with long slender hairs on 5th and 6th abd. segments.

Genotype: *Prospinanura kardosia* n. sp.

Prospinanura kardosia n. sp. (Figs. 6-10)

Length up to 1 mm. White in color with sparse specks and splotches of bluish pigment over body. Body *Achorutinae*-like in general appearance with last 2 segments narrower. Mouthparts not produced in a cone. Prothorax well developed. With at least 8 large, heavy, long, pointed spines on dorsum of last abd. segment situated 4 in anterior row, 3 in middle row, and 1 on posterior of segment (Figs. 8 and 10). Also many long, thin bristles or setae on last segment, with several on 5th abd. segment. The large bristles or setae of ventral surface of last segment are thin as other body clothing which consists of short curving hairs over body and intermingled with the larger clothing of last 2 segments. Antennae shorter than head or as 50:70, with joints as: 15:15:10:15. The last 2 antennal jts. are nearly fused, only a faint demarcation being noted ventrally. Basal 2 antennal joints swollen and much larger in diameter than last 2. With 6-8 large curved heavy sense setae on 4th ant. segment, and with a large sense bulb (Fig. 6). Eyes two on each side of head on separate spots sparsely or partially pigmented with blackish pigment. In some the anterior eye cornea seemed unpigmented. Post-antennal organ absent. Unguis untoothed, falcate (Fig. 9). Unguiculus absent or represented by a tubercle. Furcula absent.

Type locality S. Glendale, Utah. Taken from squaw bush leaves and soil by G. F. Knowlton and E. H. Kardos, April 19, 1951.

Neobeckerella n. gen.

Eyes 8 on each side on dark patches. Post antennal organ composed of a single tubercle. Furcula present but reduced and with dens-mucro much reduced. Anal horns absent. Unguis and unguiculus present. Tenent hairs present. In general appearance this genus resembles *Beckerella* Linnaniemi in that it has a single, elongate, elliptical P.A.O. tubercle, but it differs in that the unguiculus is present.

Genotype: *Neobeckerella allusa* n. sp.

Neobeckerella allusa n. sp. (Figs. 11-12)

Length 1 mm. Deep purplish blue dispersed over body, lighter beneath and at intersegmental sutures. Legs but sparsely pigmented. Eyes 8 on each side on dark eye-spots (Fig. 11). Post-antennal organ a single elliptical, elongate tubercle situated in a slight pit near base of antennae. Unguis nearly straight, untoothed on inner margin. Unguiculus lamellate basally, ending in a spine (Fig. 12). Body clothing of short reclinate hairs.

Herod, Illinois, April 18, 1944, Ross and Sanderson, in ground cover.

Dicyrtomina rossi n. sp. (Figs. 13-14)

Length up to 1.0 mm. Ground color yellowish on which purple pigment is dispersed in streaks and spots, along with round light areas and spots. Laterally with irregular purple pigmented streaks; with a horseshoe-shaped streak on postero-lateral margin. Dorsally with dark streak between eyes extending down to front. Purple pigment dispersed on cheeks and vertex of head. Antennae purplish distally with lighter pigment basally on 2nd and 1st segments. Legs with but traces of pigment. Ventral tube pigmented. Eyes 8 and 8. Antennae longer than head, proportions of segments as 8:50:40:20; subsegments lacking. Claws only slightly curved, stout. Unguis (Fig. 13) with well developed tunica which reaches nearly to tip, with two inner teeth, lateral teeth, and a pair of serrated pseudonychia. Unguiculus with a tooth on the inner edge and a subapical seta which extends to end of unguis. Subanal appendage of female simple, curving. Dorsum of abdomen with sparse long hairs anteriorly and numerous short, stouter hairs posteriorly. Dentes with several simple setae dorsally. Mucro

(Fig. 14) with both margins serrate, spoon-shape.

Salem State Park, Illinois, Jan. 26, 1944, T. H. Frison, wooded hillside; Collinsville, Ill., Feb. 9, 1944, ground cover, T. H. Frison.

***Isotoma perseae* n. sp.** (Figs. 15-16)

Length up to 1.0 mm. Deep bluish-grey on a yellow background. Antennae deep blue throughout. Body with many round light spots intermingled with the pigment. Most of these light spots inclose the long setae on the body. Legs and manubrium with scattered blue pigment, dentes and mucro light. Clothing of short to moderate length setae anteriorly and with very long setae on last segment. Eyes 8 on each side on black eyespots. Post-antennal organ broadly elliptical and slightly bent in middle. Antennae a third longer than head; segments as 10:15:15:28. Unguis curving, with baso-lateral tooth and 1 distal weak inner tooth. Unguiculus (Fig. 16) lamellate at base, with inner spine, and a distal one. One knobbed tenent hair. Furcula reaches ventral tube. Manubrium with numerous ventral setae; to dentes as 2:5. Mucro quadridentate (Fig. 15), similar to *olivacea*. Tenaculum with several anterior setae.

Magnolia, Illinois, May 24, 1944, H. H. Ross, from ground cover.

***Achorutes gami* n. sp.** (Figs. 17-19)

Length up to 0.75 mm. Body a light blue color spotted and specked over a yellow background. Venter, legs, and antennae lighter pigmented with blue. Antennae slightly shorter than head, with long curving hairs and sensory setae anteriorly; with a terminal sense bulb. Eyes 8 on each side on black spots (Fig. 19). Post-antennal organ of 4 round tubercles with a "nebenhöcker." Unguis untoothed on inner margin. Unguiculus (Fig. 18) lamellate basally and with a terminal spine. Three tenent hairs present, knobbed. Rami of tenaculum 3-dentate. Anal horns 2, very short, slightly curved, on papillae. Mucro short, somewhat truncate, to dens as 2:7 (Fig. 17). Dens with 5 dorsal setae. Clothing of short reclinate hairs and with longer ones posteriorly.

Magnolia, Illinois, May 24, 1944, H. H. Ross, in ground cover.

***Achorutes magnoliana* n. sp.** (Figs. 20-23)

Length 1.0 mm. Body with yellow background spotted and heavily specked with dark purplish pigment, intermingled with light spots and areas. Legs, venter, and manubrium lightly pigmented. Antennae purple throughout. Antennae shorter than

head. Relative lengths of ant. jts. as 10:10:15:20. With many long hairs on last 2 joints, and with several long curving sensory setae, one originating at tip. Eyes 8 on each side on dark spots (Fig. 22). Post-antennal organ consists of a quadrangular tubercle. Unguis with one tooth on inner margin near distal end. With two knobbed tenent hairs. Unguiculus absent. Mucro long and tapering; to dens as 10:15 (Fig. 21). Dens with 4 dorsal setae. Anal horns 2, extremely minute (Fig. 23). Clothing of short, reclinate hairs and longer ones posteriorly.

Magnolia, Illinois, May 24, 1944, H. H. Ross, in ground cover; Starved Rock St. Pk. Illinois, Nov. 8, 1943, Ross and Sanderson.

Pseudachorutes rugatus n. sp. (Figs. 24-25)

Length up to 2.0 mm. Body with deep bluish pigment all over and with white spots on dorsum, under parts lighter. Antennae subequal to head, 4th segment with several large sensory hairs. Post-antennal organ (Fig. 24) with about 28-30 tubercles. Mouth cone strongly produced. Body expanded and slightly spindle-shaped. Unguis with one tooth, basally, on inner margin. Unguiculus tuberculate. Tenent hairs absent. Dentes about twice the mucro, with about 6 dorsal setae, dorsally tuberculate. Mucro (Fig. 25) only slightly curved, dorsally tuberculate. Body hairs short, sparse, and with longer downward pointing hairs on last segments.

La Rue, Illinois, April 18, 1944, in ground cover, Ross and Sanderson.

Isotoma lucama n. sp. (Figs. 26-28)

Length up to 1.0 mm. Color a pinkish-red to deep purple pigment over body with numerous light spots and areas. Antennae slightly longer than head or as 60:50, joints as 10:12:12:20. Eyes 8 on each side on dark patches (Fig. 28). Postantennal organ broadly elliptical about 3 times the diameter of an eye. Unguis untoothed on inner margin, with outer teeth (Fig. 26). Unguiculus lamellate basally, without inner tooth. Rami of tenaculum 4-dentate, with 8 setae on corpus. Body covered quite thick with moderate length hairs, longer on posterior. Manubrium half the dentes, with many dorsal and ventral setae. Dentes stout. Mucro (Fig. 27) quadridentate. 5th and 6th abdominal segments ankylosed or but faintly demarcated as in *Pseudisotoma*.

Antioch, Illinois, Oct. 27, 1943, in woody debris, Ross and Sanderson.

Genus *Spinisotoma* Stach, 1926

Body isotomine in general shape. Eyes 8 on each side. Post-antennal organ present. The 4th abd. segment subequal to 3rd, or longer than 3rd in Subgenera *Frisonia* and *Cliforga*. Furcula reaching ventral tube. The 5th and 6th abdominal segments indistinctly separated or nearly ankylosed as in above subgenera. With 4 to 8 heavy spines on the dorsum of the 5th abdominal tergite or on the ano-genital segment (5th and 6th). Dentes about twice the manubrium. Unguis present, with or without teeth. Unguiculus present. Mucro bidentate or quadridentate. Clothing of short and long hairs, and with outstanding longer, ciliate hairs on posterior abdominal segments. Pigment well developed.

Subgenus *Spinisotoma s. str.*

3rd and 4th abdominal segments subequal. 4 to 8 heavy spines in a row across dorsum of abdomen at point where 5th and 6th segments join. Mucro bi- or quadri-dentate. Long outstanding hairs, ciliate, situated posteriorly on body.

***Spinisotoma* (*Spinisotoma*) *dispersa* n. sp. (Figs. 29-34)**

Length up to 0.7 mm. Color a light blue dispersed over a yellowish-gray background. Pigment in specks and spots, lighter at sutures. With small round light spots showing through pigment over body. Legs, antennae, and manubrium with pigment (Fig. 34). Eyespots black. Blue pigment heavier on a line between eyes and base of antennae, with dark interocular spot. Antennae subequal to head, the segments as 7:8:8:15. Eyes 8 on each side (Fig. 32), the three posterior ones almost separated from others. Post-antennal organ oval-elliptical. Unguis (Fig. 31), untoothed; unguiculus lamellate basally. Tenent hairs absent. Manubrium about half the dens. Dentes with 2 rows of dorsal setae and with many ventral ones, with a long distal spine (Fig. 29). Dens with serrations very prominent ending 2 mucro lengths from end. Mucro quadridentate. Anal spines yellow, 4 in number, long, in a line on dorsum of ano-genital segment or just at demarcation of 5th and 6th segments.

Upson County, Georgia, July 2, 6, 22, 1936, W. F. Turner; Union Co., Illinois, Sept. 18, 1936; Smith Park, Mt. Carroll, Ill., Dec. 6, 1945, Ross and Sanderson.

Subgenus *Frisonia*

4th abdomen segment longer than 3rd. Up to 8 heavy spines on dorsum of males (females lacking spines) on dorsum of ano-genital segment. 5th and 6th segments ankylosed or nearly so. Spines not situated in a single row, but in 2 or 3 rows. With long, special sensory setae near spines. Outstanding ciliate hairs present on posterior of body.

Subgenotype: *Frisonia veca* n. sp.

***Frisonia veca* n. sp. (Figs. 35-42)**

Length up to 0.8 mm. Deep purplish-blue pigment over body through which many round and irregular light spots are evident (Fig. 35). Antennae purple throughout. Dorsum of head heavily pigmented and more so on vertex and front, with V-shape dark line. Coxae dark purple, other leg joints much lighter. Antennae subequal to or slightly longer than head; proportions of joints as 7: 10: 10: 20. Organ of 3rd segment of 2 bent sense rods (Fig. 36). Eyes 8 on each side, equal (Fig. 37). Postantennal organ consists of a broadly elliptical tubercle, 3 times the size of an eye. Unguis untoothed on inner margin. Unguiculus (Fig. 38) with spine on inner lamella. Tenent hairs wanting. Ano-genital segments ankylosed and bearing dorsally a specialized sensory field (Fig. 42); consisting of 7 large horn-like spines situated: one in center of posterior end of body, then 2 just anterior to this one, and then anteriorly an irregular row of 4, two larger lateral spines and 2 inner smaller ones. Anterior to these is a row of 7 large sensory setae. Each of these setae arise from a base consisting of specialized cells forming the sense organ. This cell area extends around posterior to the row of 4 large spines. In this area there are 6 long, curving hairs intermingled with numerous shorter hairs. Short hairs over body. Rami of tenaculum 4-dentate, corpus with 1 seta. Dentes twice manubrium, with several dorsal and lateral setae. Mucro (Fig. 39) quadridentate, with a mucronal bristle.

Collinsville, Illinois, Feb. 9, 1944, in ground cover, T. H. Frison.

Subgenus *Cliforga*

Similar to *Frisonia* but for 6 heavy spines present situated in 3 rows, the last 2 spines on posterior of 6th segment. Long outstanding smooth hairs present.

Subgenotype: *Cliforga alleghaniensis* n. sp.

Cliforga alleghaniensis n. sp. (Figs. 43-45)

Similar in general appearance to *F. veca*. Deep purplish pigment dispersed over body with round areas showing through. Antennae purplish throughout, head heavier pigmented on dorsum, with V-shape line between eyes. Dorsum of body with pigment arranged in three broken lines from mesonotum to end. Eyes 8 on each side. Post-antennal organ elongate-elliptical situated close to antennal base. Antennae subequal to head; segments as 5:8:8:11. Unguis (Fig. 44) with lateral teeth, inner margin un-toothed. Unguiculus lamellate at base, terminating with bristle. Tenent hairs absent. 4th abdominal segment longer than 3rd. On ano-genital segment are 6 heavy, yellow spines, two in a line anteriorly, then 2 smaller ones just posterior to these, and two large ones on posterior of abdomen (Fig. 43). All spines situated on large papillae. With 4 smooth long outstanding hairs situated near spines. Body clothed with short, reclinate hairs and one row of longer hairs to each body segment. Dentes and manubrium subequal. Dens with several setae dorsally and ventrally. Mucro (Fig. 45) short, quadridentate.

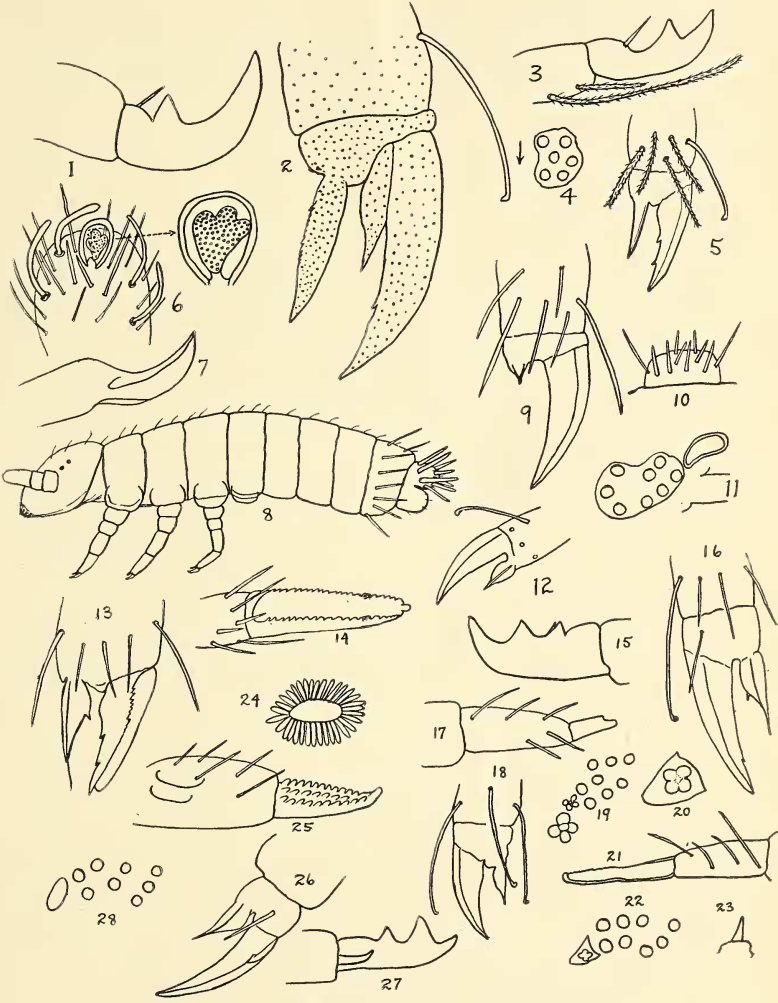
Type locality: Alleghany County, Virginia, Hill 4200, May 15, 1949, R. L. Hoffman; other localities, Caledonia, Illinois, June 7, 1944, M. W. Sanderson and Leighton.

Isotomurus bemakus n. sp. (Figs. 46-47)

Length up to 2 mm. Bluish to light purplish pigment over body. Legs and venter lighter. Antennae with pigment heavier on distal part of segments. Pigment heavier on posterior of each body segment. Antennae longer than body, segments, as 30:50:55:80.

EXPLANATION OF PLATE IV

Sinella hoffmani n. sp. Fig. 1. Unguis. 2. Mucro. *Pseudosinella collina* n. sp. 3. Mucro. 4. Eyes and eyespot. 5. Unguis. *Prospinaura kardosia* n. sp. 6. Antennal sense bulb. 7. Mandible. 8. Lateral view of body. 9. Left front foot. 10. End of abdomen. *Neobeckerella allusa* n. sp. 11. Eyes and postantennal organ. 12. Foot. *Dicyrtomina rossi* n. sp. 13. Foot. 14. Mucro. *Isotoma persea* n. sp. 15. Mucro. 16. Foot. *Achorutes gami* n. sp. 17. Dens-mucro. 18. Foot. 19. Left eyes. *Achorutes magnoliiana* n. sp. 20. Postantennal organ. 21. Dens-mucro. 22. Left eyes. 23. Anal horn. *Pseudachorutes rugatus* n. sp. 24. Postantennal organ. 25. Dens-mucro. *Isotoma lucama* n. sp. 26. Foot. 27. Mucro. 28. Eyes.



Eyes 8 on each side on dark patches (Fig. 46). Postantennal organ elliptical, curving and very near antennal base. Unguis long, falcate, untoothed on inner margin, with lateral teeth. Unguiculus lanceolate, nearly straight, only about half length of unguis. Rami of tenaculum 4-dentate, with several setae on corpus. Body clothing of short hairs, longer setae, and with bothriotricha on posterior of body. Dentes nearly 3 times manubrium. Mucro tridentate (Fig. 47).

Chicago, Illinois, March 24, 1941, in dwelling, W. E. McCauley.

***Odontella substriata* n. sp. (Figs. 48-49)**

Length up to 1.25 mm. Color blue all over, lighter beneath, eye-spots black. Pigment on dorsum in crossbands across middle of each body segment. Antennae shorter than head. Eyes 5 on each side. Mouth cone well developed. Postantennal organ 4-5 lobed in a deep pit (Fig. 49). Unguis broad, nearly straight, with lateral teeth, inner margin untoothed. Unguiculus absent. Two slender unknobbed hairs overhand unguis. Mucrones a third shorter than dentes, with 2 dorsal cups, and a turned up cupped apex (Fig. 49). Rami of tenaculum 3-dentate. Clothing sparse; integument tuberculate.

Logan, Illinois, March 7, 1945, Ross and Sanderson.

***Isotoma sandersoni* n. sp. (Figs. 50-52)**

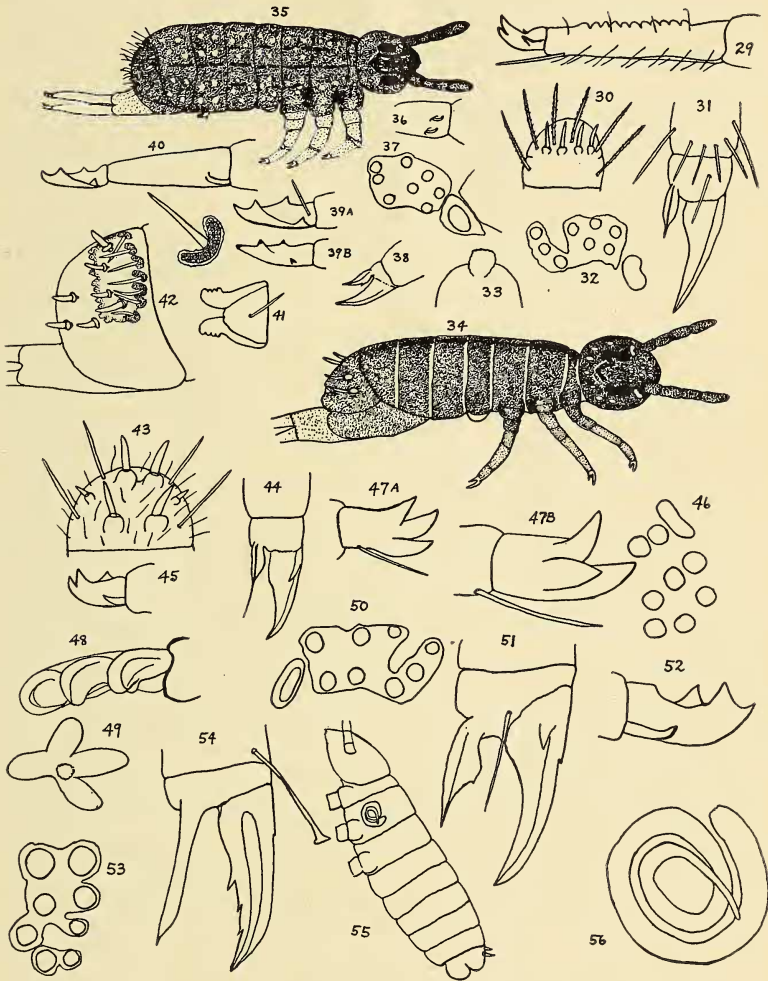
Length 1.3 mm. Color pinkish red all over, varying to a purplish tinge in some. Lighter beneath, on legs, and at sutures. Lighter

EXPLANATION OF PLATE V

Spinisotoma (Spinisotoma) dispersa n. sp. 29. Dens-mucro. 30. End of abdomen with spines. 31. Right front foot. 32. Eyes. 33. End of antenna. 34. Lateral view of body. *Frisonia veca* n. sp. 35. Lateral view of body. 36. Organ of 3rd antennal segment. 37. Eyes. 38. Foot. 39. Mucro. 40. Mucro-dens. 41. Tenaculum. 42. Sensory field and spines. *Cliforga alleghaniensis* n. sp. 43. End of abdomen. 44. Foot. 45. Mucro. *Isotomurus bemakus* n. sp. 46. Eyes. 47. Mucro. *Odontella substriata* n. sp. 48. Postantennal organ. 49. Mucro. *Isotoma sandersoni* n. sp. 50. Eyes. 51. Foot. 52. Mucro. *Entomobrya anthema* n. sp. 53. Eyes. 54. Foot. Internal parasitic worm in *Onychiurus subtenuis*, 55 and 56, in mesothoracic position. The *O. subtenuis* was 1.5 mm. in length and the worm was estimated as being about 0.15 mm. in length uncoiled.

BULL. B.E.S. VOL. XLVII

PLATE V



areas showing through. Antennae longer than head, segments as 15:18:20:38. Eyes (Fig. 50) 8 on each side, 2 inner ones slightly smaller. Postantennal organ elliptical, slightly elongate. Unguis (Fig. 51) with lateral teeth, inner margin untoothed. Unguiculus with or without a weak tooth on inner lamella. Rami of tenaculum 4-dentate, with 8 setae on corpus. 5th and 6th abdominal segments ankylosed or with but a faint demarcation. Dentess twice manubrium, with numerous dorsal and lateral setae. Mucro (Fig. 52) quadridentate. Clothing of numerous short hairs and a row of outstanding hairs to each segment, more numerous posteriorly.

Apple R. Can. St. Pk. Illinois, Dec. 6, 1945, Ross and Sanderson.

Entomobrya anthema n. sp. (Figs. 53-54)

Color: general yellowish background with faint traces of blue pigment dispersed over dorsum of thorax, becoming heavier on lateral margins and along line of coxae. A band of pigment around 3rd and anterior part of 4th abd. segment, broken on dorsum; a broken band on posterior of 4th segment; venter of 5th with pigment; pigment traces on legs, but a ring of pigment at distal end of femorae, especially 3rd; with pigment ringed at antennal joints, 4th joint heavier pigmented. Eyes 8 on each side (Fig. 53), the eyespots only pigmented immediately around cornea. Antennae very long, nearly as long as body, segments as 70:95:100:115. Furcula very long reaching to front coxae. Unguis with basolateral teeth and 3 teeth on inner margin (Fig. 54). Tenent hair large, strongly knobbed. 4th abdominal segment over 6 times the 3rd or as 190:30. Mucro with two teeth and basal spine, entomobrya-form. Length 2.0 mm.

Giant City St. Pk., Illinois, March 6, 1945, Ross and Sanderson.

Figures 55 and 56 show an internal parasitic worm (possibly a Nematoda?) found coiled within the lower thoracic region of a prepared specimen of *Onychiurus subtenuis*. This would indicate that Collembola as other animals would be subject to internal parasitism.